

Macroeconomic Activity Module

The Macroeconomic Activity Module (MAM) represents the interaction between the U.S. economy as a whole and energy markets. The rate of growth of the economy, measured by the growth in gross domestic product (GDP) is a key determinant of the growth in demand for energy. Associated economic factors, such as interest rates and disposable income, strongly influence various elements of the supply and demand for energy. At the same time, reactions to energy markets by the aggregate economy, such as a slowdown in economic growth resulting from increasing energy prices, are also reflected in this module. A detailed description of the MAM is provided in the EIA publication, *Model Documentation Report: Macroeconomic Activity Module (MAM) of the National Energy Modeling System*, DOE/EIA-M065(2003), (Washington, DC, January 2003).

Key Assumptions

The output of the U.S. economy, measured by GDP, is expected to increase by 3.0 percent between 2001 and 2025 in the reference case. The growth in GDP can be decomposed into two key factors: the growth rate of the labor force and the rate of productivity change associated with the labor force. As Table 6 indicates, GDP growth is slower for the first four years of the forecast period, reflecting current economic conditions. Growth in the economy recovers for the remaining of the forecast period, primarily due to continued increases in productivity growth. The growth of the labor force depends upon the forecast population growth and the labor force participation rate. The Census Bureau's middle series population projection is used as a basis for the *AEO2003*. Total population is expected to grow annually by 0.8 percent between 2001 and 2025, but the share of population over 65 is expected to increase over time. While the projected labor force growth slows down because of demographic changes, it remains relatively strong as more people over 65 decide to stay in the work force.

The productivity of labor is the second major reason for economic growth and reflects the positive effects of a growing capital stock of the economy as well as technological change occurring over time. A key to

Table 6. Growth in Gross Domestic Product, Labor Force, and Productivity
(Percent per Year)

Assumptions	2001-2005	2005-2010	2010-2015	2015-2020	2020-2025	2001-2025
GDP (Billion Chain-Weighted \$1996)						
High Growth	3.6	4.1	3.4	3.3	3.3	3.5
Reference	3.0	3.4	3.1	2.9	2.8	3.0
Low Growth	2.4	3.1	2.6	2.2	2.2	2.5
Labor Force						
High Growth	1.4	1.4	1.1	0.9	1.1	1.2
Reference	1.2	1.0	0.9	0.7	0.9	0.9
Low Growth	0.9	0.8	0.7	0.4	0.6	0.7
Productivity						
High Growth	2.1	2.7	2.3	2.3	2.2	2.3
Reference	1.8	2.4	2.2	2.1	1.9	2.1
Low Growth	1.4	2.2	1.9	1.8	1.5	1.8

Source: Energy Information Administration, *AEO2003* National Energy Modeling System runs: *AEO2003.d110502c*; *lm2003.d110502c*; and *hm2003.d110502c*.

achieving the reference case's long-run 3.0 percent growth is an anticipated steady growth in labor productivity. In the very short term, productivity growth is relatively weak reflecting current economic uncertainty. As the economy recovers, capital stock is expected to grow at a stronger pace. Business fixed investment as a share of nominal GDP is expected to rise. The resulting growth in the capital stock and the technology base of that capital stock helps to sustain productivity growth just over 2 percent.

For the forecast period, disposable income is projected to grow at an annual rate of 2.9 percent, and disposable income per capita at 2.1 percent. Non-agriculture employment is projected to grow at 1.0 percent per year, while employment in manufacturing is projected to grow more slowly at 0.2 percent per year.

To reflect the uncertainty in forecasts of economic growth, the *AEO2003* forecasts use high and low economic growth cases along with the reference case to project the possible energy markets. The high economic growth case incorporates higher population, labor force and productivity growth rates than the reference case. Due to the higher productivity gains, inflation and interest rates are lower compared to the reference case. Investment, disposable income, and industrial production are increased. Economic output is projected to increase by 3.5 percent per year between 2001 and 2025. The low economic growth case assumes lower population, labor force, and productivity gains, with resulting higher prices and interest rates and lower industrial output growth. In the low economic growth case, economic output is expected to increase by 2.5 percent per year over the forecast horizon.

The regional disaggregation of the economic variables uses regional shares based on a regional model solution. These shares change over time, but do not change as energy prices change from the projected reference price path.